REMARKS

Applicants respectfully request consideration of this application. The following arguments are provided to impart precision to the claims, by more particularly pointing out the invention, rather than to avoid prior art.

35 U.S.C. § 103 Rejections

Examiner has rejected claims 1-2, 4-5, 36-38 and 40 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,084,302 to Sandhu ("Sandhu") in view of U.S. Patent No. 5,108,597 to Funkenbusch et al. ("Funkenbusch").

Examiner has rejected claims 30-35 under 35 U.S.C. §103(a) as being unpatentable over Noorily (in the record) in view of Funkenbusch.

Examiner has rejected claims 3, 6-7, 39, and 41 under 35 U.S.C. §103(a) as being unpatentable over Sandhu in view of Funkenbusch as applied to claims 1-2, 4-5, and 8 above, and further in view of Noorily.

Claim 1 and 36

Applicants respectfully disagree that the combination of Sandhu and Funkenbusch describes each and every element of claim 1 or claim 36 as amended.

Claim 1 as amended requires a printed circuit board including a carbon-based cladding having a carbon concentration greater than 60 percent by weight over a portion of a conductive member and a thickness used to tune an impedance of said first signal line. Specifically, claim 1 requires "a first signal line supported on said dielectric board member." The first signal line "including an elongated electrically

conductive member that is enshrouded with <u>a carbon-based</u> cladding having <u>a carbon concentration greater than 60 percent by weight</u> over at least a portion of the elongated conductive member <u>to tune an impedance of said first signal line</u>."

Claim 36 as amended claims similar limitations as the limitations of claim 1 discussed above. Specifically, claim 36 requires a first signal line atop said dielectric board member, said signal line enshrouded by a carbon-based cladding having a <u>carbon concentration greater than 60% by weight</u> and <u>a thickness used to adjust an impedance of said first signal line</u>.

Funkenbusch describes the forming of carbon-clad <u>oxide particles</u> that are useful as a chromatographic support material and the cladding does not appreciably increase the diameter of the oxide spherules coated. (Funkenbusch, col. 1, ll. 5-7; col. 7, ll. 6-7). Specifically, Funkenbusch describes "the thickness of the carbon cladding over the surface of the ZrO_2 core ranges from the diameter of a single carbon atom to about 20 Å." (Funkenbusch, col. 7, ll. 3-6). Furthermore, the carbon-cladding is used to achieve a very high physical and chemical stability in aqueous media of high pH. (Funkenbusch, col. 5, ll. 22-24). The method of cladding described is "applicable to any inorganic <u>oxide substrate</u> to which carbon will deposit." (Funkenbusch, col. 8, ll. 12-15, <u>emphasis added</u>). Moreover, Funkenbusch describes a carbon-based (not carbon clad) chromatographic support materials composed of at least 99% carbon, such as packing materials for high pressure liquid chromatography. (Funkenbusch, col. 2, ll. 18 – col. 3, ll. 14).

Funkenbusch fails to describe or suggest using a carbon cladding having a thickness used to tune or adjust an impedance of a signal line because

Funkenbusch describes forming a carbon cladding on an oxide spherule for packing materials for high pressure liquid chromatography having a thickness that does not appreciably increase the diameter of the coated spherules. Furthermore, Funkenbusch fails to describe or suggest a carbon cladding having a carbon concentration greater than 60 percent by weight because Funkenbusch describes 99% carbon packing materials for high pressure liquid chromatography not a 99% carbon cladding.

Sandhu describes a method for fabricating an integrated circuit interconnect upon a semiconductor substrate <u>to prevent copper diffusion</u>. In this method a <u>copper interconnect</u> is formed. Next, a metal is embedded or inserted into the copper interconnect to provide an introduced metal, such as titanium, tantalum, tungsten, chromium, and aluminum. A gas is reacted with the introduced metal to form a <u>barrier layer cladding upon the copper interconnect</u>. Substantially all of the introduced metal diffuses to the surface of the copper interconnect and reacts with the gas. Once the introduced metal reacts with the gas, the resistivity of the interconnect is substantially equal to that of copper. As discussed in Applicants specification, carbon-based materials would have a resistivity (1 over conductivity) somewhere between a metal and a dielectric. (See Application, pg. 7, ll. 11-13). Thus, the carbide cladding of Sandhu consisting of metal and carbon is a cladding having a lower concentration of carbon relative to the metal (metal-based cladding).

Sandhu fails to describe or suggest using a carbon cladding having a thickness used to tune or to adjust an impedance of a signal line because Sandhu describes a barrier cladding on a copper interconnect <u>to prevent copper diffusion</u>.

Furthermore, Sandhu fails to describe or suggest a carbon-based cladding having a carbon concentration greater than 60 percent by weight because Sandhu describes a carbide cladding consisting of metal and carbon that is a cladding having a lower concentration of carbon relative to the metal.

Because Funkenbusch and Sandhu both fail to describe or suggest a carbon-based cladding having a carbon concentration greater than 60 percent by weight over at least a portion of the elongated conductive member and a thickness used to tune or to adjust an impedance of said first signal line, the combination fails to describe or suggest the above limitations. Therefore, the combination of Funkenbusch and Sandhu fails to render claim 1 and claim 36 obvious.

Furthermore, one skilled in the art of implementing transmission structures on printed circuit boards would not be motivated to combine Funkenbusch, a method for forming chromatographic support material, with Sandhu, a method for forming a barrier layer cladding around copper interconnects. First, Funkenbusch only teaches deposition of carbon on oxide substances (e.g. ZiO_2). (Funkenbusch, col. 8, ll. 12-33; col. 12, ll. 52-56). One would not be motivated to combine a reference teaching coating oxides (Funkenbusch) with a reference teaching forming a cladding for copper interconnects (Sandhu).

Moreover, the problem solved in Sandhu is also completely different from the problem solved by Funkenbusch. The Sandhu invention provides a method for preventing diffusion of copper atoms from copper metallization. (See Sandhu, col. 2, ll. 14-21). Conversely, Funkenbusch describes overcoming problems of composite support material useful in liquid stage chromatography to provide "very high physical

and chemical stability in aqueous media of high pH." (Funkenbusch, col. 6, ll. 5-29). An ordinary person skilled in the art solving a problem dealing with atom diffusion would have no motivation to look to the art of art of liquid chromatography support materials.

Because of the differences between the art of preventing diffusion of copper atoms and that of liquid chromatography support materials, one skilled in the art of implementing transmission structures on printed circuit boards would not be motivated to combine the reference of Sandhu with that of Funkenbusch. Furthermore, neither Sandhu nor Funkenbusch provide motivation to combine art of preventing diffusion of copper atoms with that of liquid chromatography support materials. Thus, the motivation can only be gleaned from impermissible hindsight.

Claims 2-8

Applicants respectfully submit that claims 2-8 depend on independent claim 1 and include all the limitations of claim 1. As such, claims 2-8 are allowable for at least the same reasons as claim 1.

Claims 37-41

Applicants respectfully submit that claims 37-41 depend on independent claim 36 and include all the limitations of claim 36. As such, claims 37-41 are allowable for at least the same reasons as claim 36.

Claim 30

Applicants respectfully submit that the combination of Noorily and Funkenbusch fails to describe each and every element of claim 30.

Claim 30 requires a carbon-based cover having a carbon concentration higher than 60 percent by weight and a thickness used to tune an impedance of said fully covered conductor elements to reduce cross talk between a set of said plurality of conductor elements. Furthermore, claim 30 requires a rigid dielectric board member having a plurality of conductor elements.

Noorily describes a flexible electric cable assembly for use with undercarpet wiring systems with electric conductors contained within a casing made from a laminate of polyester and polyvinylchloride. (Noorily, col. 3, ll. 20-25). Specifically, Noorily describes "the invention of a flexible electric cable assembly 10" having "a flexible multiconductor cable 12, an electrically insulative film 14 . . ., an electrically conductive, self-sustaining, flexible member 16 . . ., an electrically conductive, self-sustaining, flexible shield 18 . . . and a flexible shield 20, preferably comprising two plastic films. (Noorily, col. 3, ll. 6-14, emphasis added).

Therefore, Noorily fails to describe a carbon-based cover having a carbon concentration higher than 60 percent by weight and a thickness used to tune an impedance of said fully covered conductor elements to reduce cross talk between a set of said plurality of conductor elements or a rigid dielectric board member.

Funkenbusch, as discussed above, describes the forming of carbon-clad oxide particles that are useful as a chromatographic support material and do not appreciably increase the diameter of the oxide spherules coated. Thus,

Funkenbusch fails to describe <u>a carbon-based cover having a carbon concentration higher than 60 percent by weight</u> and <u>a thickness used to tune an impedance of said fully covered conductor elements to reduce cross talk between a set of said plurality of conductor elements</u>, for at least the reasons discussed above. Moreover, Funkenbusch fails to describe a rigid dielectric board member.

Because Noorily and Funkenbusch both fail to describe or suggest the limitations discussed above, the combination fails to describe the limitations discussed above. Therefore, the combination fails to render claim 30 obvious.

Moreover, one skilled in the art of implementing transmission structures on printed circuit boards would not be motivated to combine the teachings of a reference describing a flexible flat conductor electrical cable assembly, Noorily, with a method for forming chromatographic support material, Funkenbusch.

Furthermore, the problem solved in Noorily is also completely different from the problem solved by Funkenbusch. The Noorily reference describes overcoming problems related to use of flexible, thin profile cable assembly, such as heat dissipation, electrical transfer capability and enhanced accommodation of piercing by sharp objects. (Noorily, col. 2, ll. 5-10). Conversely, Funkenbusch describes overcoming problems of composite support materials useful in liquid stage chromatography to provide "very high physical and chemical stability in aqueous media of high pH." (Funkenbusch, col. 6, ll. 5-29). Thus, an ordinary person skilled in the art of solving a problem dealing with flexible, flat conductor electrical cable assemblies would have no motivation to look to the art of liquid chromatography support materials.

Because of the differences between the art of cables and that of liquid chromatography support materials, one skilled in the art of cables would not be motivated to combine the reference of Noorily with that of Funkenbusch. Furthermore, neither Noorily nor Funkenbusch provide motivation to combine cable technology with that of liquid chromatography support materials. Thus, the motivation can only be gleaned from impermissible hindsight.

Claims 31-35

Applicants respectfully submit that claims 31-35 depend on independent claim 30 and include all the limitations of claim 30. As such, claims 31-35 are allowable for at least the same reasons as claim 30.

CONCLUSION

Applicants respectfully submit that the rejections have been overcome by the remarks. Accordingly, Applicants respectfully request the objection and the rejection be withdrawn and the claims allowed. If the allowance of these claims could be facilitated by a telephone conference, the Examiner is invited to contact Michael A. Bernadicou at (408) 720-8300.

Pursuant to 37 C.F.R. § 1.136(a)(3), applicants hereby request and authorize the U.S. Patent and Trademark Office to (1) treat any concurrent or future reply that requires a petition for extension of time as incorporating a petition for extension of time for the appropriate length of time and (2) charge all required fees, including extension of time fees and fees under 37 C.F.R. §1.16 and §1.17, to Deposit Account No. 02-2666.

Respectfully submitted,

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